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LAHIVE & COCKFIELD
28 STATE STREET
BOSTON, MA 02109

EXAMINER

LI, RUIXIANG

ART UNIT

PAPER NUMBER

1646

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28

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/747,774

Applicant(s)

KLEIN ET AL.

Examiner

Ruixiang Li

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-53 is/are pending in the application.

4a) Of the above claim(s) 3, 6, 12-16, 18-21, 24, 28-31, 33, 34, 38, 40-47, and 52 is/are withdrawn from consideration.

- 5) ☐ Claim(s) _____ is/are allowed.

- 6) ☒ Claim(s) 1,2,4,5,7-11,17,22,23,25-27,32,35-37,39,48-51 and 53 is/are rejected.

- 7) ☐ Claim(s) _____ is/are objected to.

- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.

- 10) ☒ The drawing(s) filed on 05 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some * c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

DETAILED ACTION

Election/Restrictions

1. Applicants' election with traverse of Group IX, claims 1, 2, 4, 5, 7-17 (all in part), 22, 23-27 (in part), 32, 35-39 (in part), 48, and 49-53 (in part), drawn to a mixture of recombinant cells expressing **an orphan cell surface receptor**, in Paper No. 17 is acknowledged. Applicants further elected the following species: a fluorescent detectable signal for claims 10, 12-16, and 27; β -galactosidase for claim 11; and yeast cell for claims 23, 24, 35-38, and 49-52.

The traverse is on the ground that the subject matter of these groups represents different embodiments of a single inventive concept for which a single patent should issue. This has been fully considered but is not deemed to be persuasive because the restriction practice for U.S. applications is different from the practice of lack of unity for the international PCT applications. The US restriction practice requires a single distinct invention, not a single inventive concept which may comprises a number of inventions.

Applicants argue that the patent statutes require that applicants disclose how to make and use the compounds of the invention. It is only reasonable that Applicants be allowed to prosecute the compounds and the methods for using the compounds in a single application. This has been fully considered but is not deemed to be persuasive because while the inventions directed to compounds and the methods of using the compounds related as product and process of using, they are

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two distinct inventions. The patent statutes require that applicants disclose how to make and use the compounds of the invention do not imply, in any means, that the inventions directed to compounds and the methods of using the compounds will not be restricted. More importantly, this argument is irrelevant because ***the method claims 54-76, whose prosecution resulted in U, S, Patent No. 6,255,059, had already been canceled even before the restriction requirement issued in Paper No.13.***

Applicants argue that a sufficient search and examination with respect to the subject matter of all claims can be made without serious burden. Applicants further argue that the search and examination of all the claims will have substantial overlap and Groups I-XI have the same class and subclass. This has been fully considered but is not deemed to be persuasive because inventions having the same class and subclass do not necessarily mean they are the same invention. For example, two nucleic acids with entirely different sequences would be grouped to two different inventions, even though they have the same class and subclass. In addition, classification is only one criterion to determine whether inventions are distinct. Having the same classification does not mean that inventions have the same status in the art, as Applicants have argued. Since each group invention represents a distinct invention, search and examination of all the claims in all the invention groups would constitute an undue burden on the office.

Applicants argue why a single invention group in the parent application is considered as 11 groups of inventions in the instant application. The Examiner notes that the previous Examiner may simply choose to combine 11 distinct inventions in a

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single group. However, one Examiner's choice does not prohibit another Examiner from properly restricting the distinct inventions. Furthermore, with changing and ever-maturing art, significant search burdens are established.

Applicants argue that it would be extremely burdensome and expensive for Applicants to have to file eleven different patent applications. This has been fully considered but is not deemed to be persuasive because the restriction practice is based upon the distinctness of inventions, not solely based upon applicants' time and cost. It would be necessary to file 11 applications if applicants intend to patent the subject matter claimed in all the invention groups.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 1-53 are pending. Claims 1, 2, 4, 5, 7-11, 17 (all in part), 22, 23 (in part), 25-27 (in part), 32, 35-37 (in part), 39 (in part), 48, 49-51 (in part), and 53 (in part) are under consideration. All other claims are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Substitute Specification

3. The substitute specification filed August 16, 2002 in paper No. 12 has not been entered because it does not conform to 37 CFR 1.125(b) because it is not accompanied by a statement that the substitute specification contains no new matter. The applicants' statement about submission of a substitute specification in compliance with 37 C.F.R. 1.52 appears to be an error; it should be 37 CFR 1.125(b).

Drawings

4. The drawings submitted on April 5, 2001 in Paper No. 3 are accepted by the Examiner.

Claim Rejections—Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claim 1, 2, 4, 5, 7-11, 17, 23, 25-27, 35-37, 39, 49-51, and 53 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 12, 16, 18-20, and 23 of U.S. Patent No. 6,100,042.

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Although the conflicting claims are not identical, they are not patentably distinct from each other. Claims 1, 2, 12, 16, 18-20, and 23 of U.S. Patent No. 6,100,042 recite a mixture of recombinant yeast cells, each cell of which comprises (a) a heterologous G- protein-coupled receptor (which acts as a surrogate for an endogenous yeast pheromone receptor in a pheromone system pathway of the yeast cells) expressed in the cell membrane of said cell such that signal transduction activity via said receptor is modulated by interaction of an extracellular region of the receptor with an extracellular signal; (b) a heterologous polypeptide, wherein the heterologous polypeptide is transported to a location allowing interaction with the extracellular region of the receptor; wherein collectively the mixture cells express a library of said heterologous polypeptide, said library being expressed at a sufficient level such that modulation of the signal transduction of the receptor by a heterologous polypeptide within the library provides a detectable signal. The claims of the instant application recite a mixture of recombinant yeast cells, each cell of which comprises (a) a receptor protein (or an expressible recombinant gene encoding a heterologous cell surface receptor) whose signal transduction activity is modulated by interaction with an extracellular signals; (b) an expressible recombinant gene encoding a heterologous potential receptor effector polypeptide; and (c) a reporter gene. Thus, the application claims are generic to the claims of U.S. Patent No. 6,100,042. Since the species anticipates a genus, the claims of U.S. Patent No. 6,100,042 anticipate the application claims. Therefore, rejection of claims 1, 2, 4, 5, 7-11, 17, 23, 25-27, 35-37, 39, 49-51, and 53 is required under the judicially created doctrine of obviousness-type double patenting.

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7. Claim 1, 2, 4, 5, 7-11, 17, 23, 25-27, 35-37, 39, 49-51, and 53 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21, 23, 24, 26, 28, 29, 31, 32, 34, and 36 of U.S. Patent No. 5, 789, 184 or U.S. Patent No. 5,876,951. Although the conflicting claims are not identical, they are not patentably distinct from each other. Claims 21, 23, 24, 26, 28, 29, 31, 32, 34, and 36 of U.S. Patent No. 5, 789, 184 or U.S. Patent No. 5,876,951 recite a mixture of recombinant yeast cells, each cell of which comprises (i) a pheromone system generating a detectable signal; (ii) an expressible gene construct encoding a heterologous surrogate of a yeast pheromone system protein, said surrogate being a kinase and performing in the pheromone system; and an expressible gene construct encoding a heterologous peptide, wherein collectively the mixture cells express a library of said heterologous polypeptide, and modulation of the pheromone system by the heterologous peptide provides the detectable signal. The claims of the instant application recite a mixture of recombinant yeast cells, each cell of which comprises (a) a receptor protein (or an expressible recombinant gene encoding a heterologous cell surface receptor) whose signal transduction activity is modulated by interaction with an extracellular signals; (b) an expressible recombinant gene encoding a heterologous potential receptor effector polypeptide; and (c) a reporter gene. Thus, the application claims are generic to the claims of U.S. Patent No. 5, 789, 184 or U.S. Patent No. 5,876,951. Since the species anticipates a genus, the claims of U.S. Patent No. 5, 789, 184 or U.S. Patent No. 5,876,951 anticipate the application claims. Therefore, rejection of claims 1, 2, 4, 5, 7-11, 17, 23, 25-27, 35-

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37, 39, 49-51, and 53 is required under the judicially created doctrine of obviousness-type double patenting.

Claim Rejections—35 USC § 101

8. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. Claims 22, 32, and 48 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific and substantial asserted utility or a well-established utility.

Claims 22, 32, and 48 are drawn to a mixture of recombinant yeast cells comprising an orphan cell surface receptor. The claimed invention is not supported by either a specific and substantial asserted utility or a well-established utility. A specific and substantial utility is one that is particular to the subject matter claimed and that identifies a “real world” context of use for the claimed invention which does not requires further research.

Since an orphan cell surface receptor has no known ligand and is not necessarily linked to any known biological functions, any known diseases or medical conditions, there is no specific and substantial utility for an orphan cell surface receptor and thus for a mixture of recombinant yeast cells comprising the orphan cell surface receptor. In addition, neither specification as filed nor art of record discloses or provides any evidence that points to a property of an orphan cell surface receptor such that another non-asserted utility would be well established. Thus, there is no

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well established utility for a mixture of recombinant yeast cells comprising the orphan cell surface receptor (See REVISED INTERIM UTILITY GUIDELINES TRAINING MATERIALS, Example 12, on page 63. <http://www.uspto.gov/web/patents/guides.htm>)

10. Claims 22, 32, and 48 are also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

Furthermore, even if the claimed invention were to have a patentable utility, the instant disclosure would not be found to be enabling for the full scope of the invention in claims 22, 32, and 48, as well as in claims 1, 2, 4, 5, 7-11, 17, 23, 25-27, 35-37, 39, 49-51, and 53.

The factors that are considered when determining whether a disclosure satisfies enablement requirement include: (i) the quantity of experimentation necessary; (ii) the amount of direction or guidance presented; (iii) the existence of working examples; (iv) the nature of the invention; (v) the state of the prior art; (vi) the relative skill of those in the art; (vii) the predictability or unpredictability of the art; and (viii) the breadth of the claims. *Ex Parte Forman*, 230 USPQ 546 (Bd Pat. App. & Int. 1986); *In re Wands*, 858 F. 2d 731, 8 USPQ 2d 1400 (Fed. Cir. 1988).

The claims recite a mixture of recombinant cells, each cell of which comprises (a) a cell surface receptor protein or an expressible recombinant gene encoding a heterologous cell surface receptor whose signal transduction activity is modulated by interaction with an extracellular signals; (b) an expressible recombinant gene

encoding a heterologous potential receptor effector polypeptide; and (c) a reporter gene. Thus, the claims encompass a mixture of recombinant cells comprising any cell surface receptors or recombinant genes encoding any cell surface receptors that are involved in any signal transduction pathways and any autocrine systems in any types of cells. However, the instant disclosure is only enabling the specific recombinant autocrine yeast cells that express cell surface GPCR and comprise a pheromone response pathway. The instant disclosure fails to provide sufficient guidance and working examples on how to make and use a mixture of recombinant yeast cells comprising any other cell surface receptors or recombinant genes encoding any other cell surface receptors that are involved in any other signal transduction pathways.

While at the time when the application was filed, it was a common practice to express a biologically active mammalian protein in yeast and a variety of heterologous proteins, including heterologous G protein-coupled receptors, had been expressed in yeast cells (e.g., see King et al, Science 250:121-123, 1990), there was limited information regarding the expression of a heterologous cell surface receptor in mammalian cells. King et al. teach the construction of a yeast cell of the species *saccharomyces cerevisiae* which expresses a human β_2 -adrenergic receptor (a heterologous G protein-coupled receptor) and a heterologous $G\alpha$ subunit of a G protein that placed the endogenous pheromone response pathway under the control of the heterologous receptor and a *lacZ* gene under the control of the pheromone responsive FUS1 gene promoter. The yeast strain chosen for this construct was a *gpa1* mutant which was non-responsive to yeast pheromones. Thus, to place a heterologous receptor functionally expressed in yeast cells for screening ligands, one

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must consider a number of critical factors, including (i) expressing a heterologous receptor; (ii) inactivating the native responsive pathway; (iii) expressing a cofactor to link the surrogate receptor to the endogenous signal transduction pathway. Thus, it is unpredictable whether an artisan would be able to make and use the claimed invention in any cell types comprising any cell surface receptors. This unpredictability is further supported by the fact that the functional expression of an orphan receptor, FPRL1, requires the expression of a co-factor, FPR complementary factor (Murphy et al, J. Biol. Chem. 267:7637, 1992, see especially page 7640, 1st column).

Another complicating factor is the autocrine system, which requires the cells to express a variegated population of receptor effector polypeptides to be tested endogenously. Despite the strategy of producing a peptide with a desired binding activity by genetically producing a library of randomly generated peptides was established before the filing of the instant application (see, e.g., Devlin et al., Science 249:404-406, July 27, 1990; Scott et al., Science 249:386-390, July 27, 1990; Cwirla et al., Proc. Natl. Acad. Sci. USA, 87: 6378-6382, 1990; Ladner et al., U. S. Patent No. 5,096,815, March 17, 1992), coexpressing a library of random peptides with a heterologous receptor had not been demonstrated in any mammalian cells. In addition, other than the specific recombinant autocrine yeast cells that express cell surface GPCR and comprise a pheromone response pathway, the instant disclosure fails to provide sufficient guidance and working examples regarding how to make and use a mixture of any other recombinant cells comprising any other heterologous receptors that are involved in other signal transduction pathways.

In view of the nature of complexity of the research in this area and the state of

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the art at the time when the application was filed, as noted above, it is unpredictable whether an artisan would be able to successfully make and use the claimed invention without undue experimentation. Accordingly, the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

Claim Rejections—35 USC § 112, 2nd paragraph

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 1, 2, 4, 5, 7-11, 17, 22, 23, 25-27, 32, 35-37, 39, 48, 49-51, and 53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are indefinite because they recite the following terms: “an expressible recombinant gene”, “a heterologous potential receptor effector polypeptide”. There is no unambiguous definition for the terms in the specification or in the art, and use of such vague terms renders the claims indefinite. The term “an expressible recombinant gene” is confusing and ambiguous as to whether the recombinant gene is operably linked in a functional manner. It is unclear as to what applicants intend or what the term includes or excludes. The term “a heterologous potential receptor effector polypeptide” is confusing with regard to “potential”. The word “effector” has no specific or art accepted meaning. Thus, it is unclear what the metes and bounds of the term are.

In addition, the claims recite "a test polypeptide". It is unclear how such "a test polypeptide" is related to "a variegated population of receptor effector polypeptides" recited by the claims.

Claim Rejections—35 USC § 103(a)

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1, 2, 4, 5, 7-11, 17, 22, 23, 25-27, 32, 35, 36, 39, 48, 49, 50, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over King et al. (Science 250:121-123, October 5, 1990) in view of Devlin et al. (Science 249:404-406, July 27, 1990), Scott et al. (Science 249:386-390, July 27, 1990), Cwirla et al. (Proc. Natl. Acad. Sci. USA, 87: 6378-6382, 1990), and Ladner et al. (U. S. Patent No. 5,096,815, March 17, 1992).

King et al. teach construction of yeast cells (*saccharomyces cerevisiae*) that express a heterologous G protein-coupled receptor, a human β_2 -adrenergic receptor, and a heterologous $G\alpha$ subunit of a G protein that placed the endogenous pheromone response pathway under the control of the heterologous receptor and a *lacZ* gene under the control of the pheromone responsive FUS1 gene promoter. The yeast strain chosen for this construct was a *gpa1* mutant which was non-responsive to yeast pheromones (Abstract). King et al. also teach that the ability to control the

yeast pheromone response pathway by expression of a heterologous adrenergic receptor and its cognate G protein α subunit may facilitate structural and functional characterization in yeast of mammalian G protein coupled receptors. By scoring for growth arrest or β -galactosidase induction, the functional properties of mutant receptors can be tested. King et al. further teach screening of ligands for putative G protein coupled receptors using these yeast cells. Specifically, King et al. teach that as additional genes for putative G protein coupled receptor are isolated, numerous ligands can be screened to identify those with activity toward the unidentified receptors (end of the article).

King et al. fail to teach yeast cells that express a variegated population of receptor effector polypeptides to be tested endogenously.

Devlin et al., Scott et al., and Cwirla et al. all teach construction of random peptide libraries on phage for screening to identifying ligands. Devlin et al. teach that random peptide libraries make it possible to identify peptides that bind to proteins (or other macromolecules) that have no previous known affinity for peptides (Abstract). Scott et al. teach that tens of millions of short peptides can be easily surveyed for tight binding to an antibody, receptor, or other binding protein using such a library (Abstract). Cwirla et al. teach that peptide libraries should be useful in discovering ligands for hormone receptors and enzymes (bottom of left column, page 6382). Ladner et al. teach screening for DNA-binding proteins by variegation of genes encoding known binding protein and selection for proteins binding the desired target DNA sequence (Abstract).

Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to construct a library of random peptides taught by Devlin et al., Scott et al., Cwirla et al., or Ladner et al. in the yeast cells taught by King et al. to produce a mixture of recombinant yeast cells comprising an expressible recombinant gene encoding a heterologous cell surface receptor and an expressible recombinant gene encoding a heterologous potential receptor effector polypeptide with a reasonable expectation of success. One would have been motivated to do so because use of peptide libraries is useful and efficient in screening for peptide ligands as taught by Devlin et al., Scott et al., Cwirla et al., or Ladner et al.

Claim Objections—Minor Informalities

15. Claims 1, 2, 4, 5, 7-11, 17, 22, 23, 25-27, 32, 35-37, 39, 49-51, and 53 are objected to because they recite the unelected subject matter (other than elected an orphan cell surface receptor). Claims 10, 11, and 27 recite unelected a detectable signal or a reporter gene. Appropriate correction is required.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ruixiang Li whose telephone number is (703) 306-0282. The examiner can normally be reached on Monday-Friday, 8:30 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler, can be reached on (703) 308-6564. The fax phone number for this Group is (703) 305-3014 or (703) 308-4242.


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Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [yvonne.eyler@uspto.gov].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0196.

Ruixiang Li
Examiner
May 20, 2003


YVONNE EYLER, PH.D
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600